

WHAT IS CLAIMED IS:

1. A method for producing a flexible anisotropic magnetic coating comprising the steps of: thermal spraying a first spray stream, comprising composite particles of magnetic particles and a matrix material, onto a substrate at a temperature that is above the glass transition or melting point temperature of the matrix material but below the Curie temperature of the magnetic particles; and applying a magnetic field to said substrate during the spraying step.

2. A method according to claim 1, wherein said magnetic particles have an H_c of greater than about 150 Oe, and wherein said matrix material has a melt-flow index from about 7 to about 700.

3. A method according to claim 1, wherein said magnetic particles are selected from the group consisting of $\text{Sm}_2\text{Fe}_{17}\text{C}$, $\text{Sm}_2\text{Fe}_{12}\text{N}_{2.7}$, $\text{Sm}(\text{CoFeCu})_7$, $\text{Nd}_2\text{Co}_{14}\text{B}$, $\text{Nd}_2\text{Fe}_{14}\text{B}$, $\text{BaFe}_{12}\text{O}_{19}$, CoFe_2O_4 , SmCo_5 , CoPt , $\text{Nd}_2\text{Fe}_{14}\text{C}$, $\text{Nd}_2\text{Fe}_{14}\text{N}$, Fe_3BiNd , $\text{SmFe}_{11}\text{Ti}$, $\text{SmFe}_{10}\text{V}_2$, $\text{SmFe}_{10}\text{Mo}_2$, and mixtures thereof; and said matrix material is selected from the group consisting of ABS, EVA, PEKK, EMAA, PMMA, EAA, polypropylene, polyvinylchloride, polyvinylacetate, nylon, polyethylene, polycarbonate, polystyrene, polyester elastomer, methacryl resin, polyacetal, polyamide resin, thermoplastic polyurethane, JCI, polytherimide, imide based polymers, polyphenylene oxide, fluoroplastics, acrylonitrile-styrene resin, ionomer resin, vinylchloride vinylacetate copolymer, polyethylene copolymer and mixtures thereof.

4. A method according to claim 1, wherein said composite particles comprise particles of matrix material having magnetic particles incorporated therein or thereon.

5. A method according to claim 4, wherein the magnetic particles have an average particle size from about 1 microns to about 84 microns, and the particles of the matrix material have an average particle size from about 20 microns to about 330 microns.

6. A method according to claim 4, further comprising the step of forming the composite particles by incorporating the magnetic particles onto or into the matrix material particles.

7. A method according to claim 6, wherein said step of forming composite particles includes a mechanofusion step.

8. A method according to claim 1, wherein particles of a matrix material, which are free of magnetic particles, are further added to said first spray stream.

9. A method according to claim 1, further comprising the step of providing at least one additional spray stream comprising a magneto-fluid mixture, said at least one additional spray stream intersecting said first spray stream at a predetermined angle to combine with said first spray stream to coat the substrate.

10. A method according to claim 9, wherein said at least one additional spray stream is produced by a Suspension Atomizing System.

11. A method according to claim 9, wherein said magneto-fluid mixture comprises magnetic particles, a vaporizable fluid, and a dispersing agent.

12. A method according to claim 1, wherein said substrate is a removable mold.

13. An article of manufacture obtained from the method according to claim 1.

14. An article of manufacture obtained from the method according to claim 9.

15. An article of manufacture obtained from the method according to claim 12.

16. An article of manufacture having magnetocrystalline anisotropic magnetic energy, comprising:

a substrate; and

a flexible magnetic coating fixedly attached to said substrate, said coating comprising magnetic particles incorporated into or onto matrix material and thermally sprayed onto said substrate in the presence of an applied magnetic field at said substrate.

17. An article of manufacture according to claim 16, wherein said magnetic particles have an H_c of greater than about 150 Oe, and wherein said matrix material has a melt-flow index from about 7 to about 700.

18. An article according to claim 16, wherein said magnetic particles are selected from the group consisting of $\text{Sm}_2\text{Fe}_{17}\text{C}$, $\text{Sm}_2\text{Fe}_{12}\text{N}_{2.7}$, $\text{Sm}(\text{CoFeCu})_7$, $\text{Nd}_2\text{Co}_{14}\text{B}$, $\text{Nd}_2\text{Fe}_{14}\text{B}$, $\text{BaFe}_{12}\text{O}_{19}$, CoFe_2O_4 , SmCo_5 , CoPt , $\text{Nd}_2\text{Fe}_{14}\text{C}$, $\text{Nd}_2\text{Fe}_{10}\text{N}$, $\text{Fe}_3\text{B/Nd}$, $\text{SmFe}_{11}\text{Ti}$, $\text{SmFe}_{10}\text{V}_2$, $\text{SmFe}_{10}\text{Mo}_2$, and mixtures thereof; and said matrix material is selected from the group consisting of ABS, EVA, PEKK, EMAA, PMMA, EAA, polypropylene, polyvinylchloride, polyvinylacetate, nylon, polyethylene, polycarbonate, polystyrene, polyester elastomer, methacryl resin, polyacetal, polyamide resin, thermoplastic polyurethane, JCI, polytherimide, imide based polymers, polyphenylene oxide, fluoroplastics, acrylonitrile-styrene resin, ionomer resin, vinylchloride vinylacetate copolymer, polyethylene copolymer and mixtures thereof.

19. An article according to claim 16, wherein said flexible magnetic coating comprises from about 8% to about 38%, by volume of the coating, of magnetic particles.

20. An article according to claim 16, wherein at least one section of said article has an easy magnetic axis.

21. An article according to claim 16, wherein said article has a coercivity of greater than about 2200 Oe.

22. A flexible anisotropic magnet, comprising magnetic particles dispersed within a matrix material and formed by thermal spraying onto a removable mold in the presence of an applied magnetic field at the mold.

23. A flexible anisotropic magnet according to claim 22, wherein said magnetic particles have an H_c of greater than about 150 Oe, and wherein said matrix material has a melt-flow index from about 7 to about 700.

24. A flexible anisotropic magnet according to claim 22, wherein said magnetic particles are selected from the group consisting of $\text{Sm}_2\text{Fe}_{17}\text{C}$, $\text{Sm}_2\text{Fe}_{12}\text{N}_{2.7}$, $\text{Sm}(\text{CoFeCu})_7$, $\text{Nd}_2\text{Co}_{14}\text{B}$, $\text{Nd}_2\text{Fe}_{14}\text{B}$, $\text{BaFe}_{12}\text{O}_{19}$, CoFe_2O_4 , SmCo_5 , CoPt , $\text{Nd}_2\text{Fe}_{14}\text{C}$, $\text{Nd}_2\text{Fe}_{14}\text{N}$, Fe_3BiNd , $\text{SmFe}_{11}\text{Ti}$, $\text{SmFe}_{10}\text{V}_2$, $\text{SmFe}_{10}\text{Mo}_2$, and mixtures thereof; and said matrix material is selected from the group consisting of ABS, EVA, PEKK, EMAA, PMMA, EAA, polypropylene, polyvinylchloride, polyvinylacetate, nylon, polyethylene, polycarbonate, polystyrene, polyester elastomer, methacryl resin, polyacetal, polyamide resin, thermoplastic polyurethane, JCI, polytherimide, imide based polymers, polyphenylene oxide, fluoroplastics, acrylonitrile-styrene resin, ionomer resin, vinylchloride vinylacetate copolymer, polyethylene copolymer and mixtures

thereof.

25. A flexible anisotropic magnet according to claim 22, comprising from about 8% to about 38%, by volume, of magnetic particles.

26. A flexible anisotropic magnet according to claim 22, wherein at least one section of said magnet has an easy magnetic axis.

27. A flexible anisotropic magnet according to claim 22, wherein said magnet has a coercivity of greater than about 2200 Oe.